Music Distance Education Resource Sharing Method Based on Big Data Platform

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Abstract. In order to promote the rapid transmission of music distance education resources, so that students can obtain more shared data information in unit time. This paper proposes a resource sharing method for music distance education based on the big data platform. According to the connection form of the big data platform architecture, determine the function capability of the virtualization sharing technology. Then, by calculating the shared weight of educational resources, the farthest transmission distance of music distance education resources in the network environment is constrained. Complete the relevant application technology analysis based on the big data platform. On this basis, construct the IaaS resource sharing structure. Combined with the established OpenStack scheduling policy, the statistical numerical indicators of shared access are calculated. To realize the smooth application of the music distance education resource sharing method based on the big data platform. The experimental results show that under the action of this new sharing method, the total value of shared data information obtained by students in unit time increases significantly. The method can promote the rapid transmission of music distance education resources, and meet the needs of practical applications.

Keywords: Big data platform · Music distance education · Resource sharing · Shared weight · Iaas structure · Openstack scheduling strategy

1 Introduction

Colleges and universities are the departments that concentrate most of the digital education resources, and their digital resource sharing status largely determines the level of my country's digital education resource sharing. However, there are still many problems in the construction and sharing of digital educational resources in various colleges and universities in my country. It hinders the further development of my country's digital education resources co-construction and sharing project. Therefore, it has certain practical significance and application value to study how to better solve these problems and realize the effective sharing of digital resources among universities [1]. With the innovation of technological means, the application of distance education is becoming more and more extensive. Media technology enriches human life, and dynamic music rhythm fills every corner of the world. The development of the music world mainly depends on the

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dissemination of the network. In music education, there are not only students heading for university or professional teacher tutoring. There are also many musicians with low education and music lovers who are not engaged in music-related majors but have great enthusiasm for music. The latter do not have the ability to receive professional music education on a regular basis in work and life. However, distance education can give them an opportunity to continue their studies and enable them to improve their musical quality.

At present, there are still many imperfections in music education in our country. Due to the unbalanced distribution of economic education in my country, it has directly led to the disparity in the level of music education in various regions. At present, excellent teacher resources and teaching equipment are gathered in the developed areas of education. In some more remote areas, the number of teachers is small and the pressure on teachers is heavy. This method cannot effectively guide students. Moreover, there are few teaching equipment, which cannot guarantee the normal use of students. At the same time, music education is also greatly limited in the current education system. General music education only exists in music classes in primary and secondary schools, and cannot meet the needs of other people from all walks of life who love music. But with the digitalization of music education, distance education can dramatically change the current situation. Not only students can learn music through distance education. In addition, people in the community can also cultivate their interest in music and learn about music theory in their spare time. With the continuous development of informatization in recent years, cloud computing, mobile Internet, and smart Internet of Things have been widely used. The amount of information data continues to grow rapidly. In order to quickly and effectively deal with a large amount of data, the storage, reading and retrieval of distance education information, etc. Big data technology has become a hot spot of attention of universities and colleges [2]. This also brings new security challenges, and more security risks need to be dealt with. Cybersecurity risks in today's era have become more diverse and complex. How to ensure data security in the current environment and how to provide students with more accurate security control strategies need in-depth research and discussion. At the same time, big data also provides new opportunities for the development of information security.

2 Applied Technical Analysis

2.1 Big Data Platform Architecture

In order to ensure the information security in the music distance education network, it is implemented through the definition of various security responsibilities. And provide support for the organization's safety management, safety operation and maintenance, and safety technology. It is divided into three layers: decision-making layer, management layer and executive layer. The safety management system and process are placed in the big data platform architecture. The security management framework provides the basis for managing risks and building trust in the system. And defines all security management elements, methods, objects, rules, processes, etc.

For the current big data computing, the distributed computing method is mainly adopted. When using distributed computing, it must face the process of data transmission and information interaction. Attackers can steal and tamper with data through various means. The data information stored, transmitted and processed in the big data platform is classified according to its risk. And on this basis, for different types of data information, according to the principle of moderate protection and acceptable residual risk. The protection of different security protection levels is carried out by grading [3]. In this way, the problem that large-scale complex systems are difficult to achieve overall high-level protection can be solved. With appropriate investment, the data and information that need to be protected can be properly protected. The complete music distance education network big data platform architecture is shown in Fig. 1.

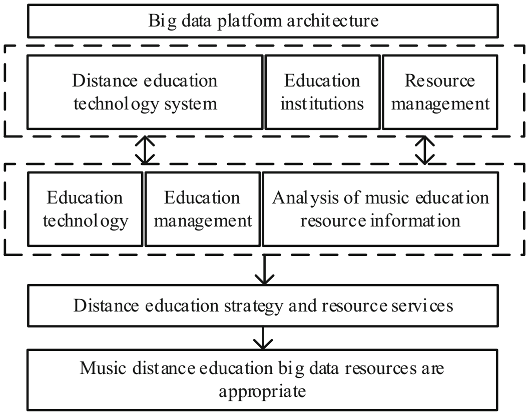

Fig. 1. Schematic diagram of the structure of the big data platform system

At all stages of the entire data life cycle, such as data collection, storage, mining, publishing, and deletion of big data applications, there is a risk of privacy leakage. Privacy in the era of big data is to carry out effective data mining without exposing user sensitive information. In the traditional information security field, more attention is paid to the security attributes such as the privacy of files. The prior art is mainly based on static datasets. Therefore, we must also consider how to realize the privacy protection and effective use of dynamic data in the complex environment of rapid data changes in the era of big data.

2.2 Virtual Sharing Technology

Virtualization is a broad and varied concept that refers to the fact that computer elements are not on real hardware facilities, but run in a virtual environment. It is a solution to optimize resources and simplify management. It simplifies the reconfiguration process while expanding hardware capacity. The main purpose of virtualization technology is to simplify the complex resource access and management process. It is not limited and constrained by physical devices and is a logical representation of resources [4]. Virtual resources manage physical resources uniformly through standardized interfaces. The interaction between physical storage and virtual resources is illustrated by some basic patterns of virtualization. This can greatly reduce the difficulty of accessing and managing physical resources.

Virtualization technology is one of the important foundations for data center to realize resource sharing and big data storage. It makes the computing power of the data center more scalable, data access is more flexible, management is simpler, and it can better serve cloud computing. Virtualization dynamically maps the physical resources of the infrastructure to application drivers, and the virtualized infrastructure creates a pool of virtualized resources. Unified management of servers, storage and networking. The resources in the resource pool can be called at any time according to the needs of the application.

Figure 2 reflects the complete framework of virtualized sharing of music distance education resources.

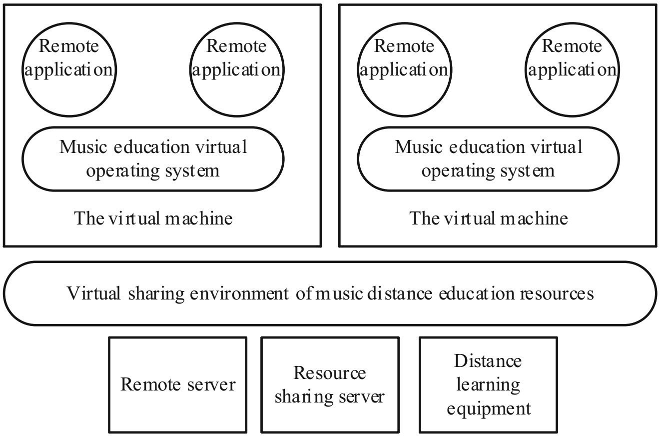

Fig. 2. A framework for virtualized sharing of music distance education resources

A virtualized infrastructure separates the music distance education environment from the underlying hardware infrastructure, allowing multiple servers, storage, and networks to aggregate into a shared pool of resources. Dynamically provide resources in the resource pool to applications in a safe and reliable manner according to user needs. According to different application fields of virtualization, virtualization can be divided into server virtualization, storage virtualization, network virtualization and so on. The core of storage virtualization is the mapping of physical storage devices to a single logical storage resource pool, which unifies various heterogeneous storage resources into a resource that is a single view to users.

2.3 Educational Resource Sharing Weight Calculation

All computing nodes are screened by the big data platform. If only one computing node passes the shared filter, the execution of this step can be skipped, and the node can be directly returned to create a virtual machine instance. Otherwise, further calculate the strategy through the weights, according to the size of the weights. Sort each node, select the node with the smallest weight, and create a virtual machine instance as the optimal computing node [5].

The shared system first obtains the performance monitoring data of all computing nodes. Then, according to the characteristics of the requested instance, the load status of the computing node is evaluated. That is, the weight is calculated, and the one with the smallest weight is selected as the target computing node. The load can be represented as a 3-dimensional vector $<$ CPU, Mem, Net $>$ related to CPU, memory, network. The algorithm should take into account these three types of resources at the same time to avoid affecting the overall performance due to optimizing a certain quantity. The specific educational resource sharing weight calculation expression is as follows.

$$D = \frac{\beta \times \overline{Y}}{\left(1 - \delta^2\right) \times \left(1 - e^1\right)} \tag{1}$$

In formula (1), β represents the sharing coefficient of music education resources based on the big data platform. $\overline{Y}$ represents the mean value of educational resource transmission per unit time. δ and e represent two different distance education scaling coefficients [6].

Music distance education resource sharing behavior is similar to CPU-intensive applications, for instances running communication-intensive applications. Network congestion due to large-scale data transmission on the network increases data transmission latency, reduces data transmission efficiency, and affects application execution. The network load is too heavy, the blocking time is prolonged, the data may be lost, and it needs to be resent. This affects the current data transfer time as well as subsequent data transfers. Even if the blocking time is not particularly long. It will also increase the total time of data transmission in the network, affecting the efficiency of data sending, receiving and processing. Therefore, when creating an instance, you should weigh the network load of the compute node to calculate the overall load.

3 Music Distance Education Resource Sharing Method

3.1 IaaS Build

Build an IaaS resource sharing structure belonging to the music distance education network. It is only necessary to install the components required for deployment according to the rigid requirements of the big data platform, combined with the infrastructure connection environment. First, it is necessary to analyze the existing hardware environment and determine the type of operating system. Next, install the authentication server. Then, install and configure and compute and mirror services. Finally, install the storage service and web console.

In the music distance education network, the IaaS resource sharing structure supports various types of application software such as RHEL, CentOS, Fedora, and Ubuntu. In order to fully share the resource information, the processing software of the Folsom version should be selected.

Authentication services are provided by the OpenStack Keystone component. It has two main functions, music education resource management: tracking and monitoring user behavior. Service Catalog: Provides users with the location of the service catalog and API endpoints available. Authentication divides users into Users, Tenants, and roles. The three of them are bound together and can be managed with the command line or by modifying the etc./nova/policy.json file for unified management.

The mirroring service is provided by the IaaS resource sharing structure. Its installation and configuration consists of two steps, configuring the mirror service backend database and the Glance configuration file. Nova node installation is the most important part. Its nodes are divided into two types: control nodes and computing nodes, the former is used to manage the latter in a unified manner.

Object storage is also provided by the IaaS resource sharing structure for mirror storage of music education resources. Dashboard is provided by OpenStack Horizon. It is used to provide a web-based management interface, both components are optional.

Music distance education is a form of music education resource dissemination based on big data platform. The core of distance education is to use appropriate methods and means to express boring content, express abstract concepts with vivid animations, and make students easier to accept and understand. To stimulate interest in learning and improve learning effect. Music micro-class is a long-distance educational activity with the help of media information tools. It spreads music education resources and music education functions outward. Students can check materials in the music micro-course database, realize the sharing of high-quality educational resources, and meet individual learning requirements. It is an educational activity with management, evaluation and regulation. At present, the research on establishing a micro-course distance education platform in ordinary colleges and universities in my country is still in the exploratory stage. Moreover, we are faced with many problems such as unreasonable design scheme and waste of teaching resources. Therefore, it is very urgent to develop a high-efficiency big data distance education platform.

Let f denote the resource information mirror storage coefficient in the IaaS structure. ϕ represents a given functional treatment index. $\hat{E}$ represents the transmission characteristics of music distance education information in the IaaS structure. χ represents a resource information discrimination coefficient related to the IaaS resource sharing structure [7]. With the support of the above physical quantities, the formula (1) can be combined, and the construction principle of the IaaS resource sharing structure can be expressed as:

$$P = \sqrt{\frac{f}{\phi - 1}} \cdot D\left(\frac{\chi}{\hat{E}}\right)^2 \tag{2}$$

The IaaS resource-sharing fabric is at the heart of OpenStack Compute. It provides endpoints for all shared API queries and initiates most deployment activities. Such as instance running, termination, etc., as well as implementing some management policies.

3.2 OpenStack Scheduling Policy

In the OpenStack Compute software architecture. The big data platform host completes the sharing task of music distance education resources through the interaction of message queue and Nova-database.

Let r denote the minimum educational resource sharing behavioral feature. A represents the initial labeling coefficient of music distance education resources. I represents the screening coefficient of the resource information to be shared. $\overline{S}$ represents the mean value of educational resource scheduling within the shared channel. u represents the resource scheduling permission based on OpenStack policy [8]. Combining the above physical quantities, the sharing capability of OpenStack policies can be expressed as:

$$W = \int_{r=1}^{+\infty} \frac{A^2 \left| I \times \overline{S} \right|}{u \cdot P} d\overline{S} \tag{3}$$

When the scheduling policy is started, when the instance is created, each computing node already has a certain load. According to user-specified requirements, virtual machine instances are created for users on compute nodes in the shortest possible time. At the same time, make the CPU, I/O and network load of each computing node as balanced as possible. The goal of the filtering strategy is to filter unavailable compute nodes. Filter out the nodes that meet the user's needs from the available computing nodes. Thereby, the coverage of the second-step operation execution is narrowed, and the waiting time of the user is shortened.

The scheduling process is mainly divided into the following steps:

According to the hardware requirements configured by the user, determine whether the shared node is available.

Based on the instance type and hypervisor type specified by the user. It judges whether the music distance education resource information meets the actual application requirements.

This paper adopts a user-defined scheduling structure to filter the shared resources.

Let α denote a given educational resource planning metric. $c_{\max}$ represents the maximum numerical result of the filtering permission of the resource to be shared. $c_{\min}$ represents the minimum numerical result of the filtering permission of the resource to be shared. h stands for shared behavior vector. b_α represents the filter criterion coefficient of music distance education resource data when the metric value α is. ω represents the resource data inductance item in the big data platform [9]. The coefficient in the formula was set with reference to the reference [9]. With the support of the above physical quantities, formula (3) is simultaneously established. The execution expression of the OpenStack scheduling policy can be defined as:

$$Z = \frac{hW \cdot |b_\alpha|^\omega}{|c_{\max} - c_{\min}|^2} \tag{4}$$

After all shared computing nodes are filtered by the filtering policy. If only one compute node passes the big data platform filter. The execution of this step can be skipped, and the node can be directly returned to create a virtual machine instance for distance education. Otherwise, further through the weight calculation strategy, according to the size of the weight, the nodes are sorted. Select the node with the smallest weight as the optimal computing node to create a virtual machine instance for distance education.

3.3 Shared Traffic Statistics

The statistics of shared visits is the final processing link in the design of the music distance education resource sharing method. It can discriminate the farthest transmission distance of music distance education resource information according to the actual connection form shown by the big data platform. On the one hand, it ensures the smooth implementation of the OpenStack scheduling policy. On the other hand, the music distance education network can also maintain a relatively stable connection state. In this way, various types of resource information are classified and stored to realize the planning of shared behavior paths.

Music distance education, a new form of education, emphasizes that learners' knowledge should be constructed by themselves in the interaction of the environment. The learner's cognition plays the main role, and the student is the main body of information processing and the active constructor. Rather than passive recipients and indoctrinated objects of external stimuli. The theory of constructivism is not only the theoretical basis for the production of music micro-lectures, but also the theoretical basis for the construction of the distance education platform of music micro-lectures.

At the same time, this special audiovisual medium is an integral part of the teaching system. Teaching activities need to control teaching objectives, teaching content and form, teaching methods, teaching quality, etc., and also need to compare teaching design schemes, and choose the best decision. It is also necessary to use feedback information to evaluate the teaching effect, and then modify the original teaching methods. Educational system cybernetics is the theoretical basis for the distance education platform of music micro-course.

In addition, the music distance education platform considers the optimal allocation of learning resources from the perspective of the teaching dissemination process and the complete teaching system. Coding and decoding are the basic theories of instructional media preparation and dissemination. Micro-lecture is a multimedia technology that integrates various media such as text, image, sound, animation and video through a computer to establish a logical connection. And they are sampled and quantized, encoded and compressed, edited and modified, stored and transmitted, and reconstructed and displayed. It is based on the teaching communication theory.

Let v_0 denote the minimum information ratio item coefficient of music distance education resource sharing behavior. v' represents the result of the maximum value of the coefficient v_0. $\dot{q}$ and $\tilde{q}$ represent two different count feature values of music distance education resource data. In the big data platform environment, the inequality condition of $\dot{q} \neq \tilde{q}$ is always established [10]. σ represents the resource sharing pattern vector associated with the $\dot{q}$ eigenvalue. ϑ represents the resource sharing pattern vector associated with the $\tilde{q}$ eigenvalues. With the support of the above physical quantities, formula (4) can be combined to express the statistical results of the shared access to music distance education resources as:

$$M = \frac{\left|1 - Z\sum_{v_0=1}^{v'} v_0\dot{q}^{-\sigma}\right|}{\sum_{v_0=1}^{v'} v_0\tilde{q}^{\vartheta^2}} \tag{5}$$

After a large number of music distance education resources are produced and collected, they need to be classified, organized and deployed. First of all, the various music micro-lectures collected should be classified according to the types of music majors and file types. Ordinary college music micro-courses can be divided into theoretical music micro-courses, performance music micro-courses, and appreciative music micro-courses. It can also be divided into vocal music micro-lessons, instrumental music micro-lessons, etc.

If the big data platform is regarded as an absolutely stable data information storage space. And in this storage environment, the resource sharing relationship between information and information will not be affected by any external conditions. At this time, the music distance education resource data to be transmitted is processed according to the statistical result of the shared traffic. It can be considered that the longer the transmission distance matched with the data information, the stronger the data inclusiveness of the sharing mode, and vice versa.

The terminal computer of the distance education platform can provide one-to-one tutoring to realize individualized teaching. You can also repeat a task tirelessly to improve learning. But the limitation of computers is that they cannot answer students' questions as flexibly and satisfactorily as teachers. It cannot directly exchange experience and share joy with students, and cannot influence students with its own noble behavior. This is the shortcoming of realizing the sharing of music distance education resources based on the big data platform.

4 Case Analysis

In order to highlight the practical application value of the music distance education resource sharing method based on the big data platform. The following comparative experiments were designed. The specific experimental procedure is as follows.

Step 1: In the distance education network environment shown in Fig. 3, the single room uses the big data platform and the traditional resource scheduling method to control the education network. The former was used as the experimental group and the latter was used as the control group.

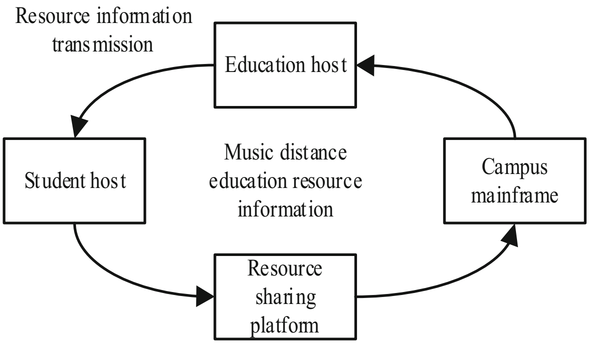

Fig. 3. Distance education network environment

Step 2: The experimental numerical results of the transmission rate of music distance education resources in the experimental group and the control group were calculated separately.

Step 3: Compare the variables of the experimental group and the control group, and summarize the experimental results.

The transmission rate of music distance education resources can reflect the total amount of shared data information obtained by students in unit time. Generally speaking, the faster the transmission rate of music distance education resources. The total amount of shared data information obtained by students per unit time is also greater, and vice versa.

Table 1 records the numerical levels of the transfer rate of music distance education resources under ideal conditions.

Analysis of Table 1 shows that under ideal circumstances, with the continuous increase of the accumulation of music distance education resource information. The transmission rate of educational resources also shows an accelerating numerical trend. However, the value increase in the early stage of the experiment was significantly larger than that in the later stage of the experiment. The global maximum of 7.26 Mb/ms is an increase of 3.94 Mb/ms compared to the global minimum of 3.32 Mb/ms.

Figure 4 reflects the specific numerical changes of the transmission rate of music distance education resources in the experimental group and the control group.

The transmission rate of music distance education resources in the experimental group maintained an increasing numerical trend throughout the experiment. When the cumulative amount of resource information is equal to 3GB and 6GB, the transmission rate level of the experimental group is lower than the ideal value level. When the accumulated amount of resource information reaches 9GB, the transmission rate level of the experimental group exceeds the ideal value level. But its mean level is always higher than the ideal value.

The transmission rate of music distance education resources in the control group maintained a numerical change state of first increasing and then decreasing. Before the accumulated amount of resource information reached 15 GB, the resource transfer rate of the control group kept increasing numerically. However, when the accumulated amount of resource information is between 15 GB and 27 GB, the resource transfer rate of the

Table 1. The ideal value for the transfer rate of educational resources

Cumulative amount of music distance education resource information /(Gb)	Resource transfer rate /(Mb/ms)
1	3.32
2	4.15
3	4.68
4	5.04
5	5.53
6	5.87
7	5.96
8	6.07
9	6.11
10	6.23
11	6.29
12	7.03
13	7.14
14	7.21
15	7.26

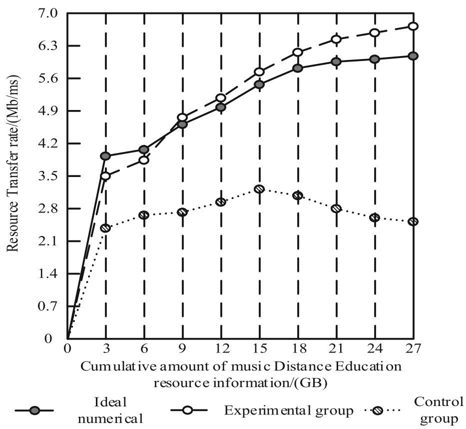

Fig. 4. Experimental values of the transmission rate of educational resources

control group has been continuously decreasing. During the whole experiment, the mean level was relatively low, and the regional maximum value was much smaller than that of the experimental group.

In summary, it can be seen that under the action of the sharing method based on the big data platform. The transmission rate of music distance education resources has been promoted to a certain extent. It can help students get more shared data information in unit time. This method is in line with the actual construction and design requirements of distance education network.

5 Conclusion

The new music distance education resource sharing method analyzes the application ability of virtualized sharing technology on the basis of big data. With the help of the IaaS resource sharing structure and the OpenStack scheduling strategy, the access to shared educational resource data is counted. It realizes the sharing of music distance education resources based on the big data platform. The experimental results show that under the action of this new sharing method, the total value of shared data information obtained by students in unit time increases significantly. From a practical point of view, with the application of this new sharing method, the transmission rate of music distance education resources has shown a significantly accelerated change trend. It can help students get more shared data information in unit time.

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